FOREIGN PATENT DATABASE

FIG. 1

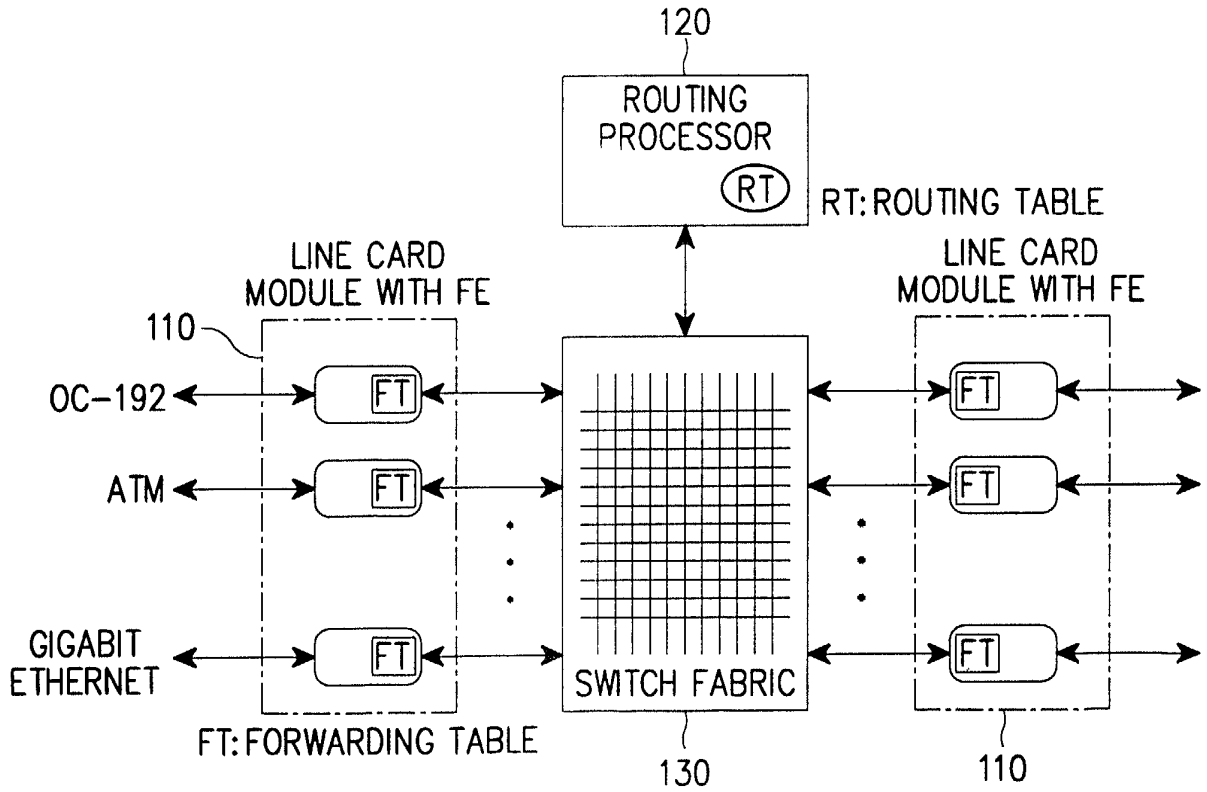
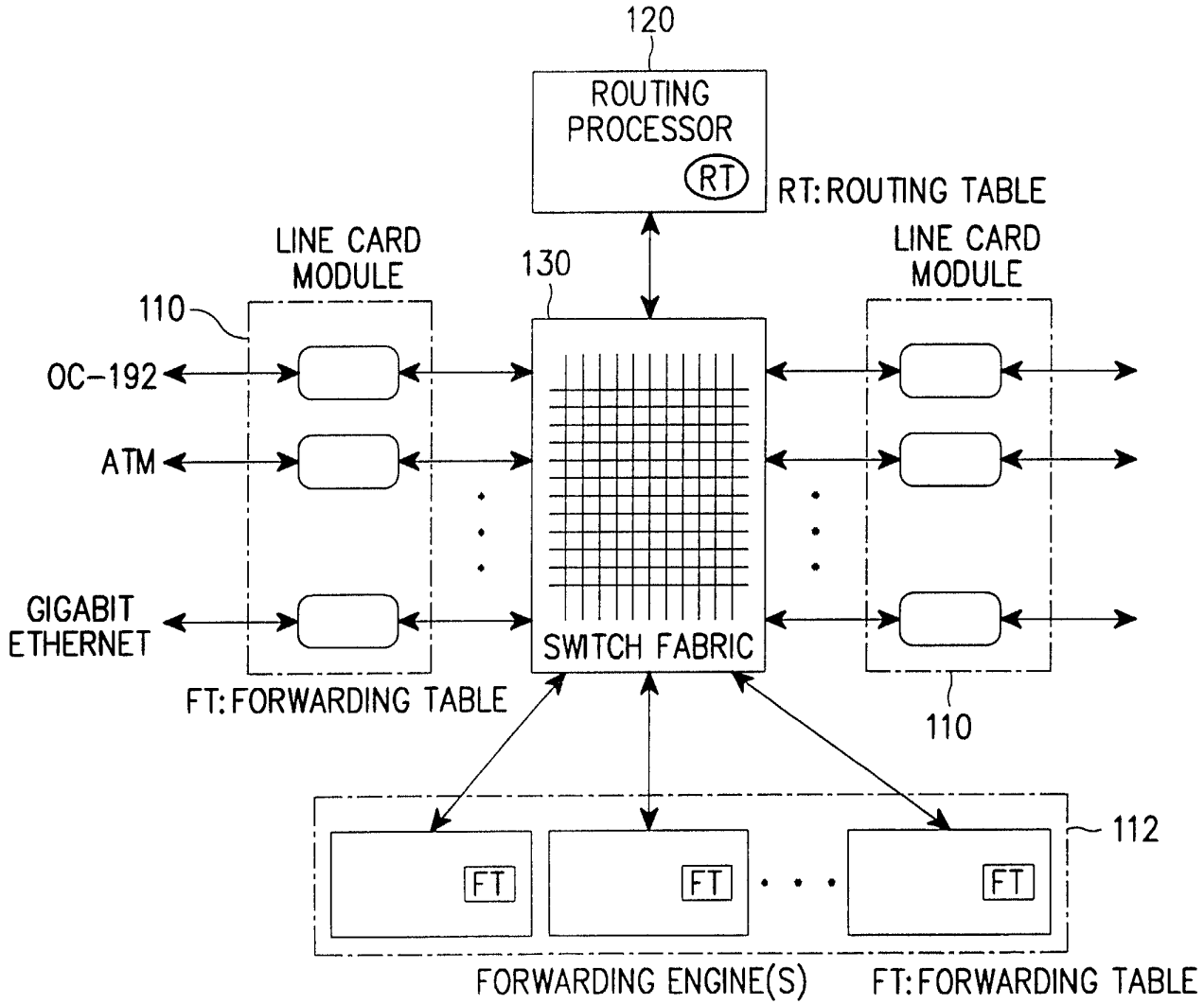


FIG. 2


120
ROUTING PROCESSOR
RT
RT: ROUTING TABLE
LINE CARD MODULE
130
LINE CARD MODULE
110
OC-192
ATM
GIGABIT ETHERNET
SWITCH FABRIC
FT: FORWARDING TABLE
110
112
FT
FT
FT
FORWARDING ENGINE(S)
FT: FORWARDING TABLE

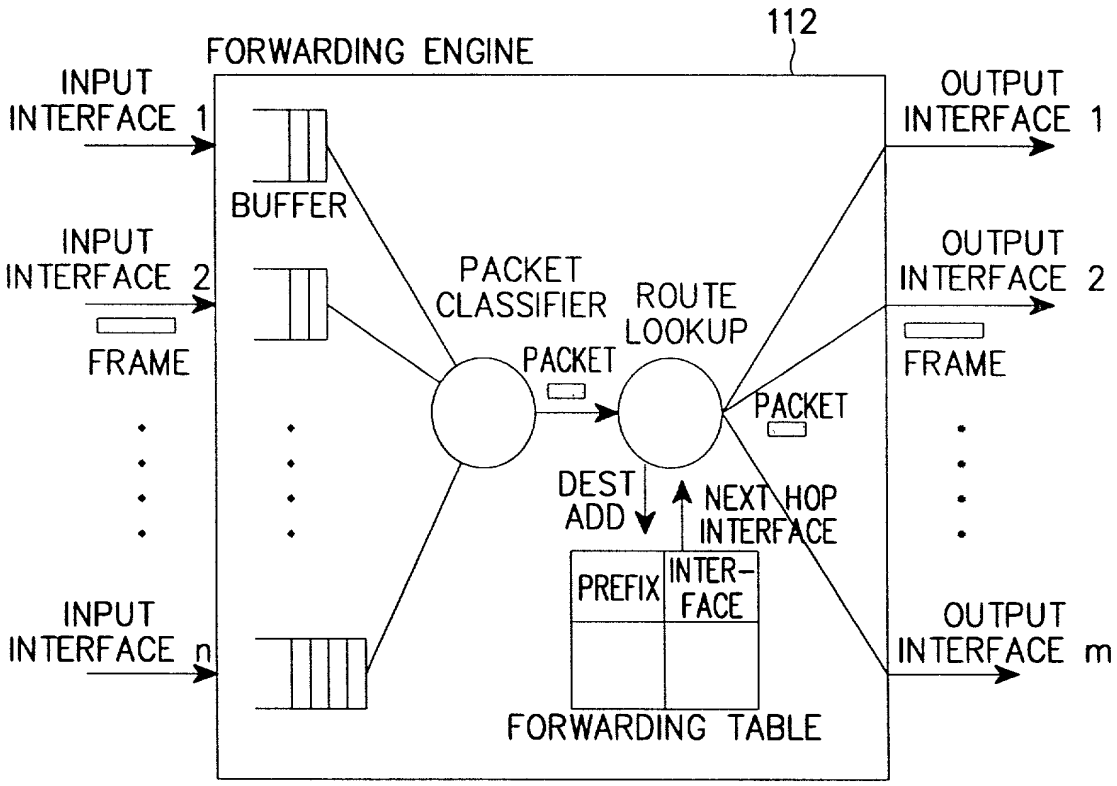

112
FORWARDING ENGINE
INPUT INTERFACE 1
INPUT INTERFACE 2
FRAME
INPUT INTERFACE n
BUFFER
PACKET CLASSIFIER
ROUTE LOOKUP
PACKET
PACKET
DEST ADD
NEXT HOP INTERFACE
PREFIX
INTER-FACE
FORWARDING TABLE
OUTPUT INTERFACE 1
OUTPUT INTERFACE 2
FRAME
OUTPUT INTERFACE m

FIG. 3

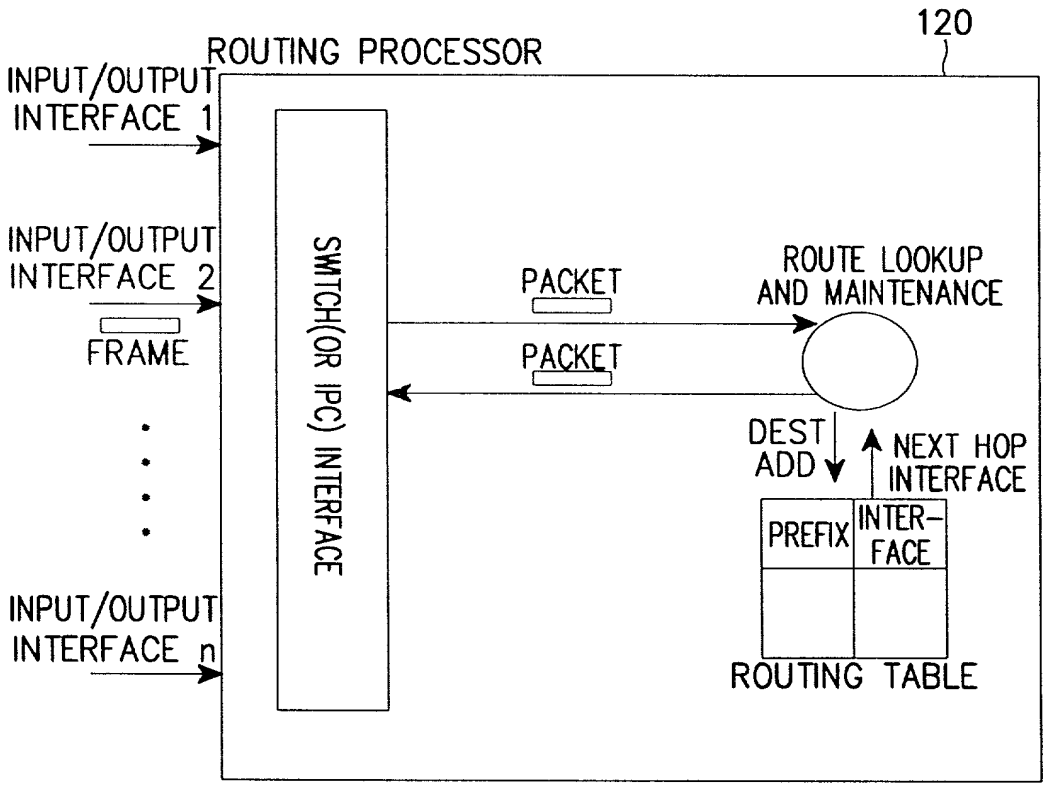

120
ROUTING PROCESSOR
INPUT/OUTPUT INTERFACE 1
INPUT/OUTPUT INTERFACE 2
FRAME
INPUT/OUTPUT INTERFACE n
SWITCH(OR IPC) INTERFACE
PACKET
PACKET
ROUTE LOOKUP AND MAINTENANCE
DEST ADD
NEXT HOP INTERFACE
PREFIX
INTER-FACE
ROUTING TABLE

FIG. 4

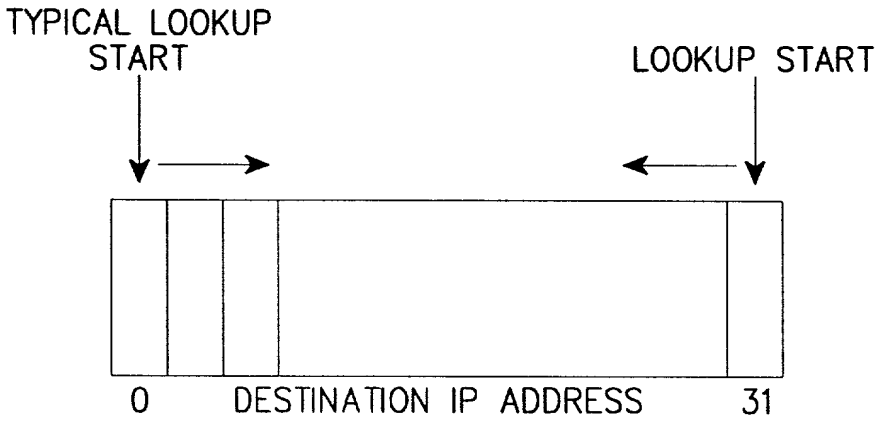
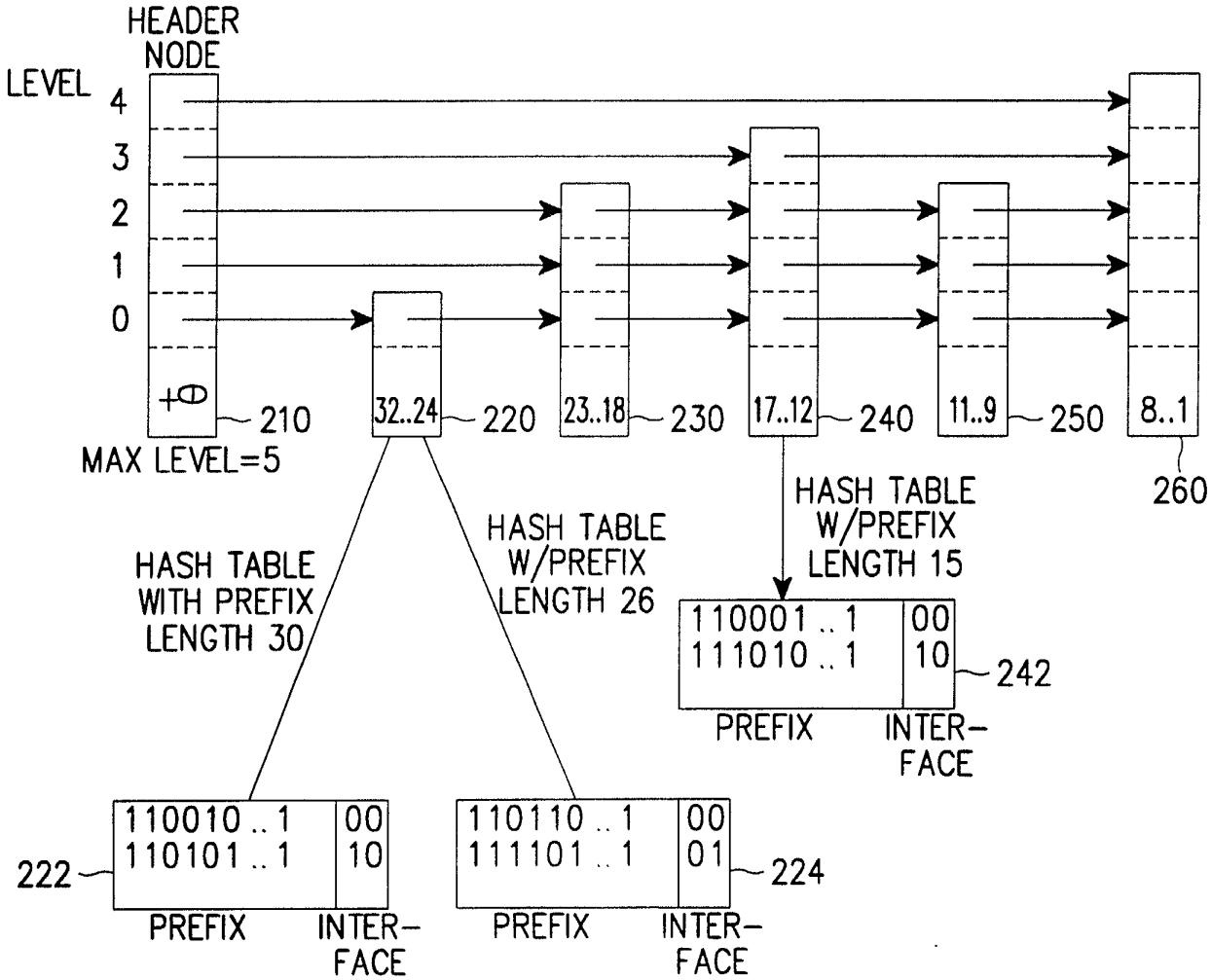

TYPICAL LOOKUP
START
LOOKUP START
0
DESTINATION IP ADDRESS
31

FIG. 5

FIG. 6


HEADER NODE
LEVEL
4
3
2
1
0
+∞
210
MAX LEVEL=5
32..24
220
23..18
230
17..12
240
11..9
250
8..1
260
HASH TABLE WITH PREFIX LENGTH 30
HASH TABLE W/PREFIX LENGTH 26
HASH TABLE W/PREFIX LENGTH 15
110001 .. 1
111010 .. 1
00
10
242
PREFIX
INTER-FACE
110010 .. 1
110101 .. 1
00
10
222
PREFIX
INTER-FACE
110110 .. 1
111101 .. 1
00
01
224
PREFIX
INTER-FACE

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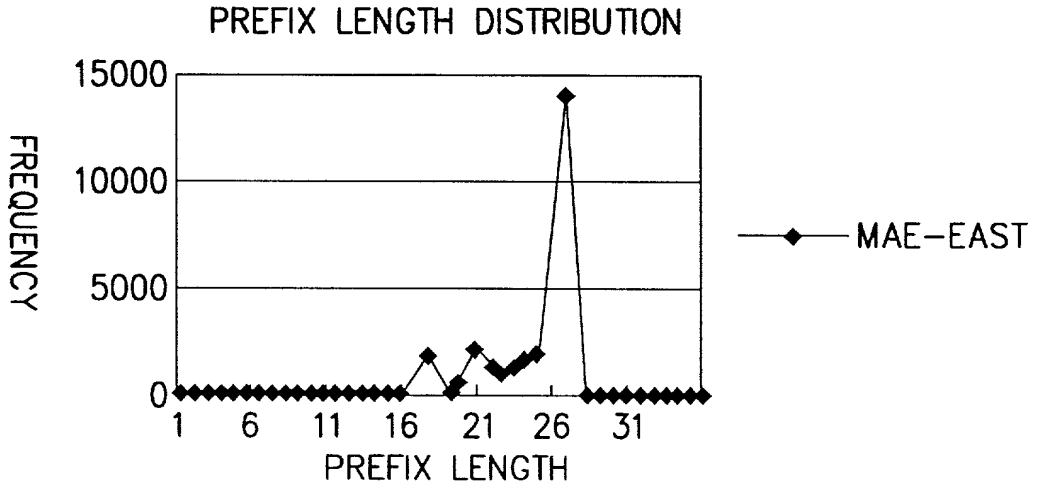


FIG. 7A

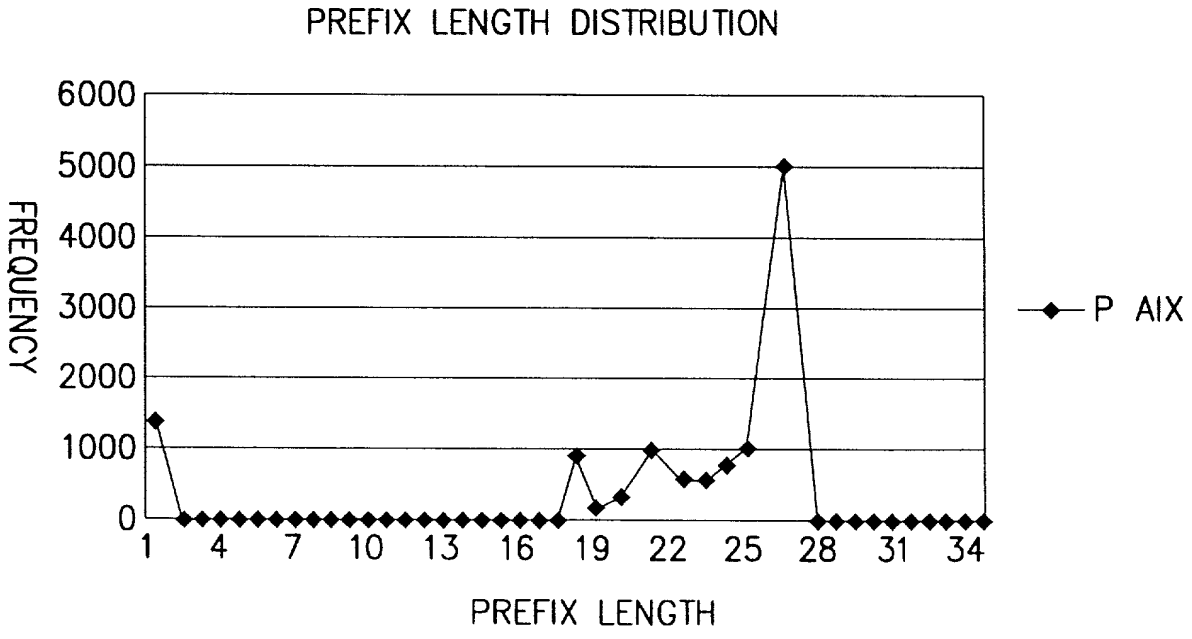


FIG. 7B

FIG. 8

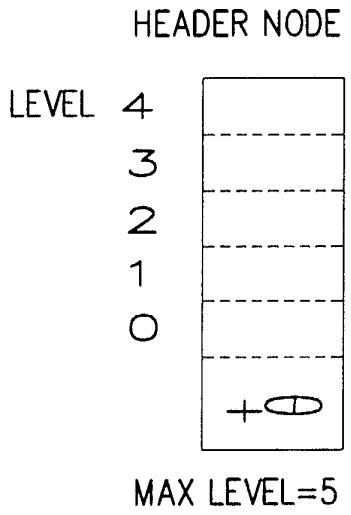
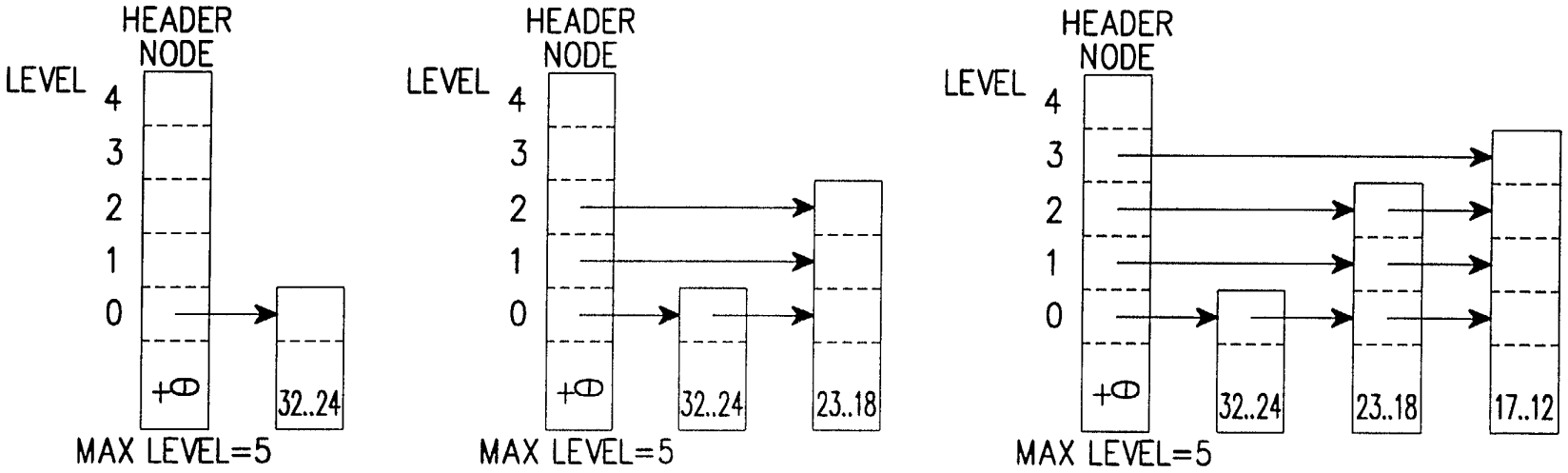
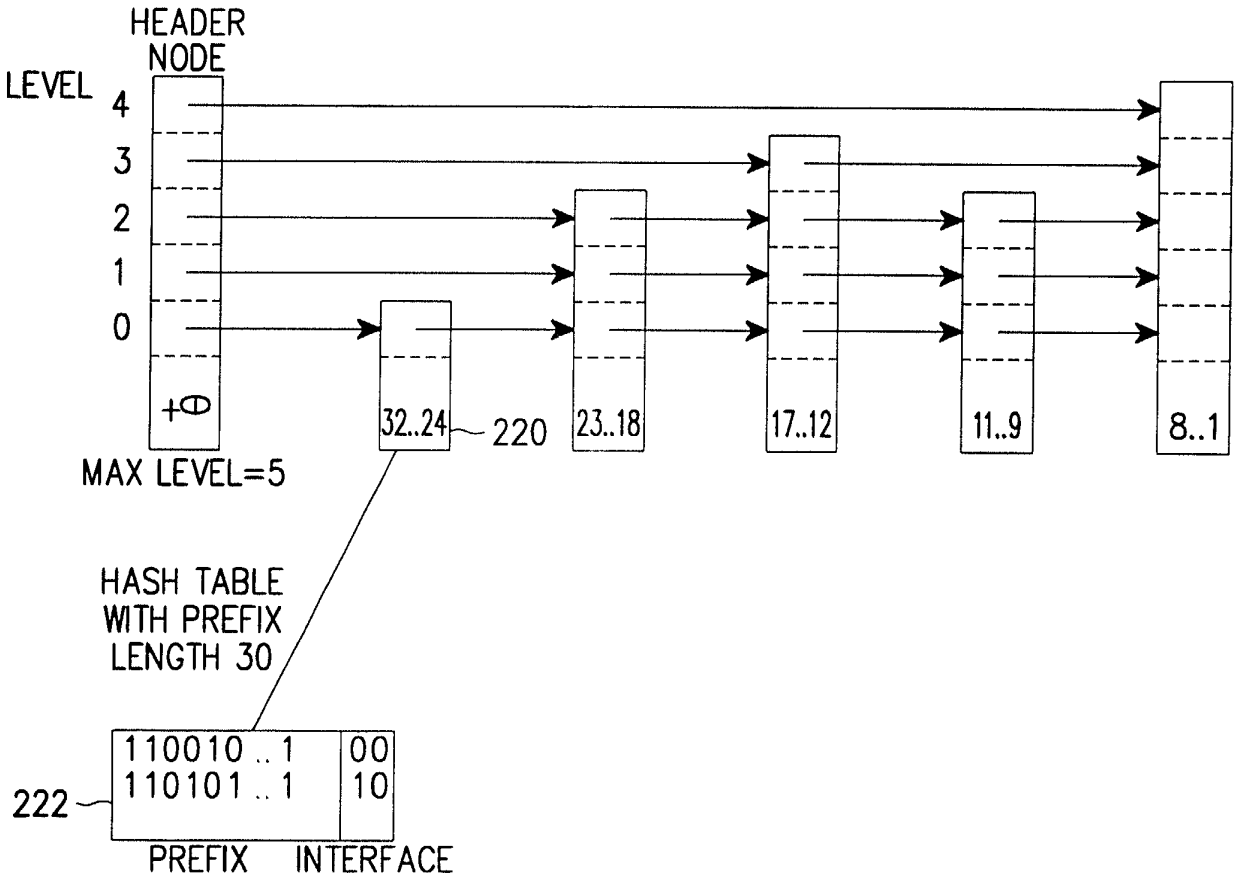


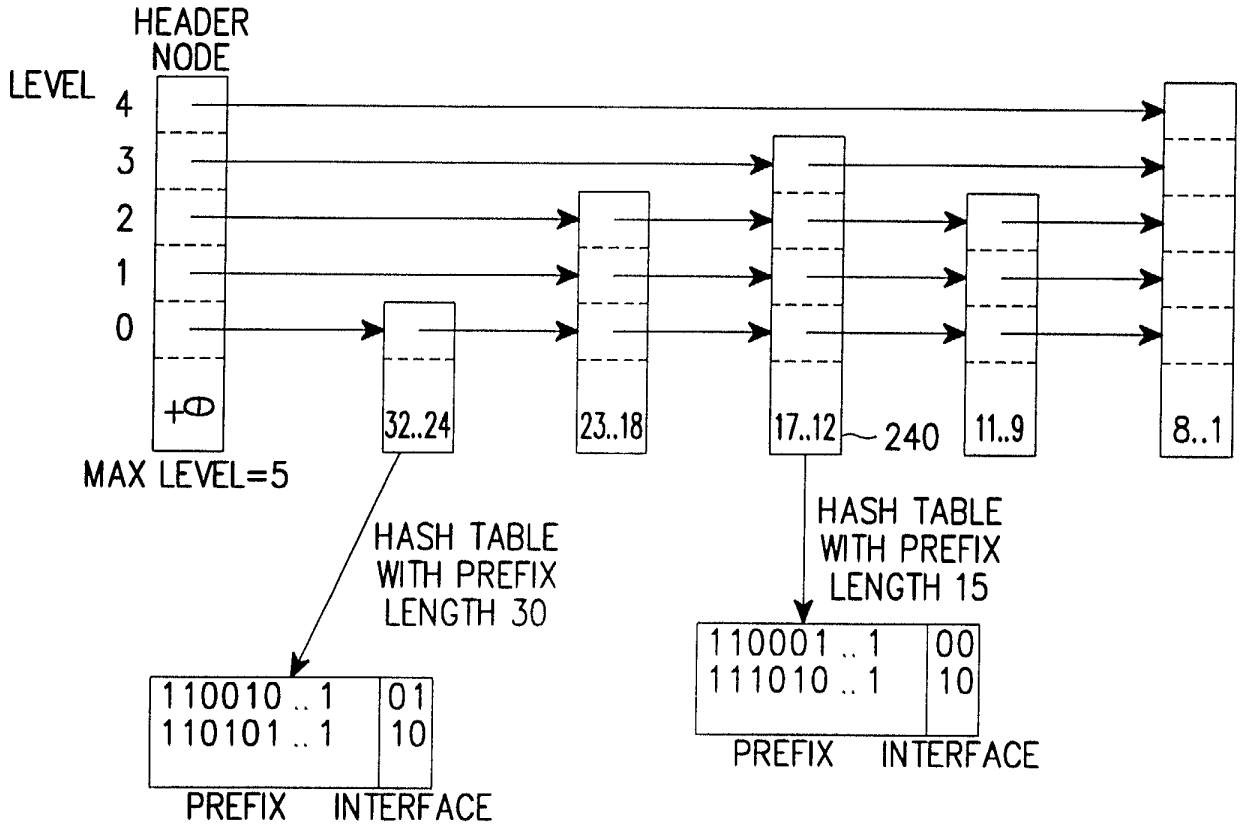
FIG. 9



(a) 1st NODE (b) 2nd NODE (c) 3rd NODE

FIG. 10A


HEADER NODE
LEVEL
4
3
2
1
0
+Φ
MAX LEVEL=5
32..24
220
23..18
17..12
11..9
8..1
HASH TABLE WITH PREFIX LENGTH 30
222
110010 .. 1
110101 .. 1
00
10
PREFIX
INTERFACE


HEADER NODE
LEVEL
4
3
2
1
0
+0
MAX LEVEL=5
32..24
23..18
17..12
240
11..9
8..1
HASH TABLE WITH PREFIX LENGTH 30
HASH TABLE WITH PREFIX LENGTH 15
110010 .. 1
110101 .. 1
01
10
PREFIX
INTERFACE
110001 .. 1
111010 .. 1
00
10
PREFIX
INTERFACE

20020240 "20020404

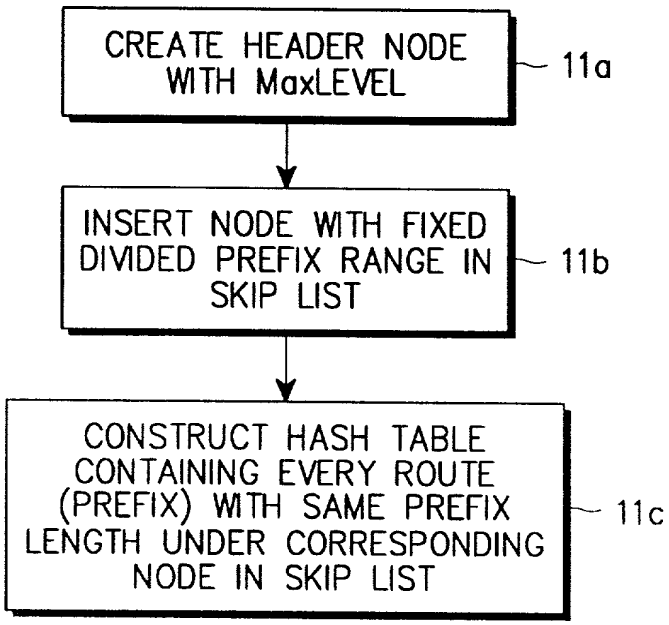


FIG. 11

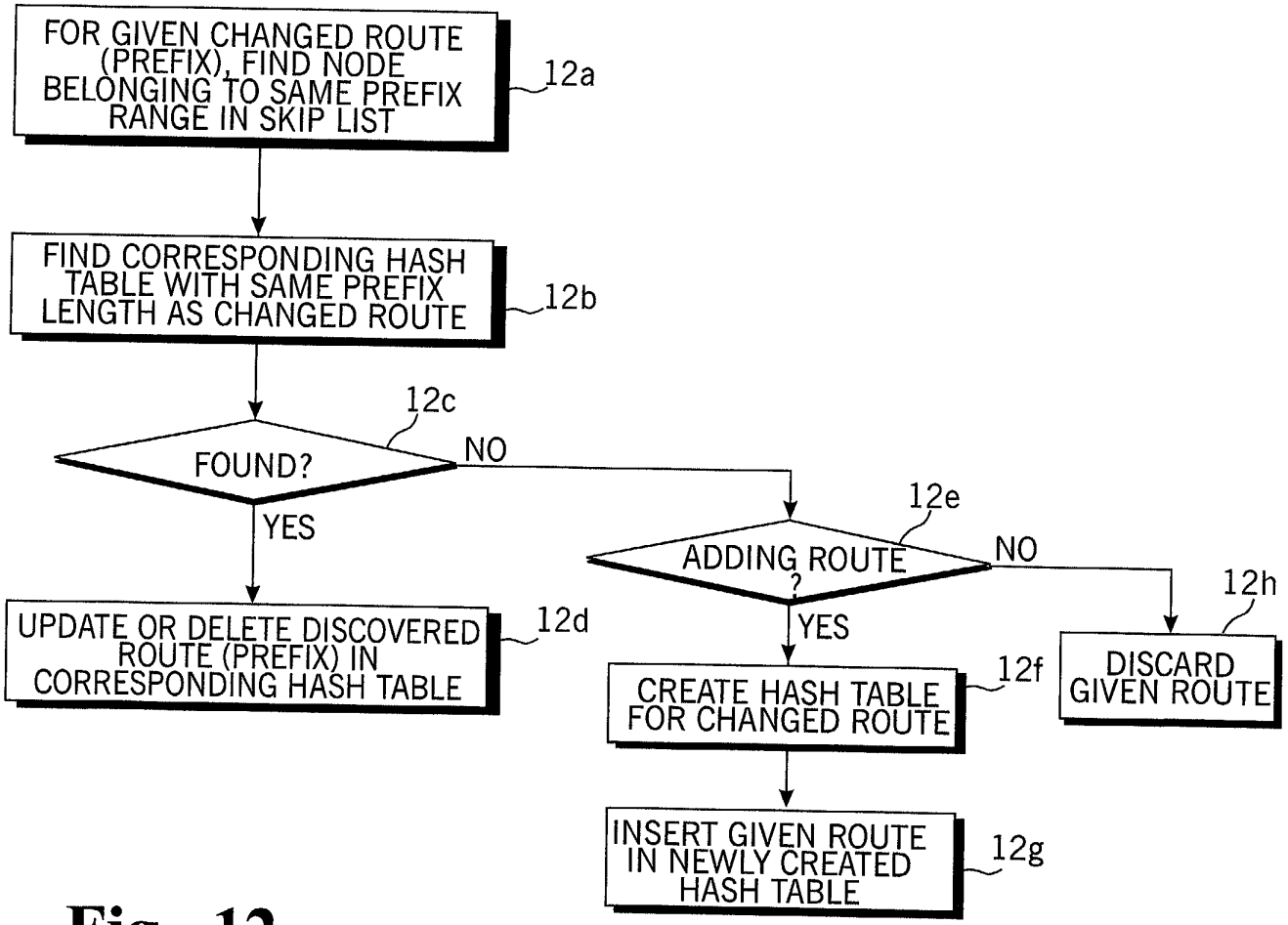

FOR GIVEN CHANGED ROUTE (PREFIX), FIND NODE BELONGING TO SAME PREFIX RANGE IN SKIP LIST
12a
FIND CORRESPONDING HASH TABLE WITH SAME PREFIX LENGTH AS CHANGED ROUTE
12b
12c
FOUND?
NO
YES
UPDATE OR DELETE DISCOVERED ROUTE (PREFIX) IN CORRESPONDING HASH TABLE
12d
12e
ADDING ROUTE ?
NO
YES
12h
DISCARD GIVEN ROUTE
CREATE HASH TABLE FOR CHANGED ROUTE
12f
INSERT GIVEN ROUTE IN NEWLY CREATED HASH TABLE
12g

Fig. 12

FIG. 13

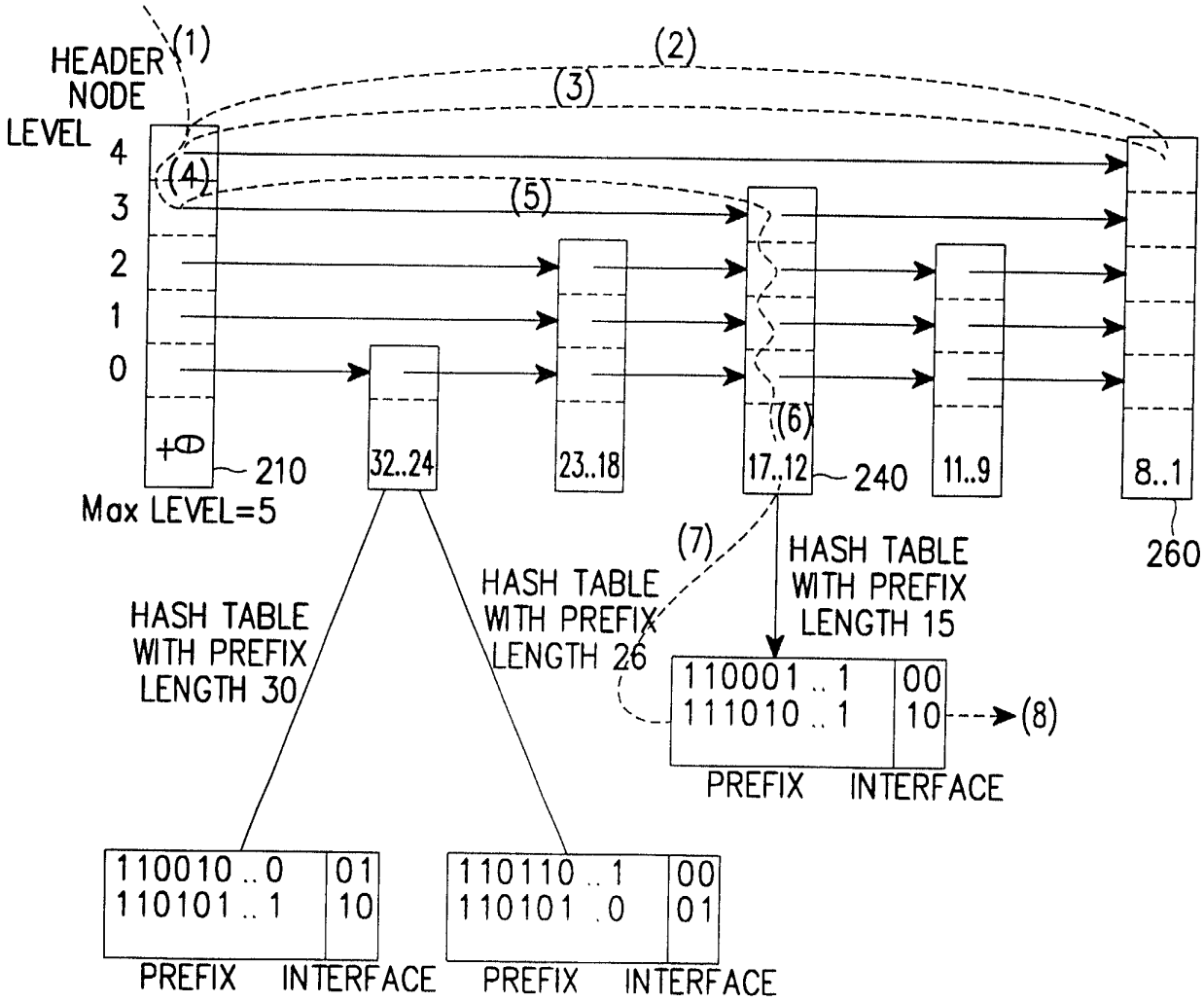
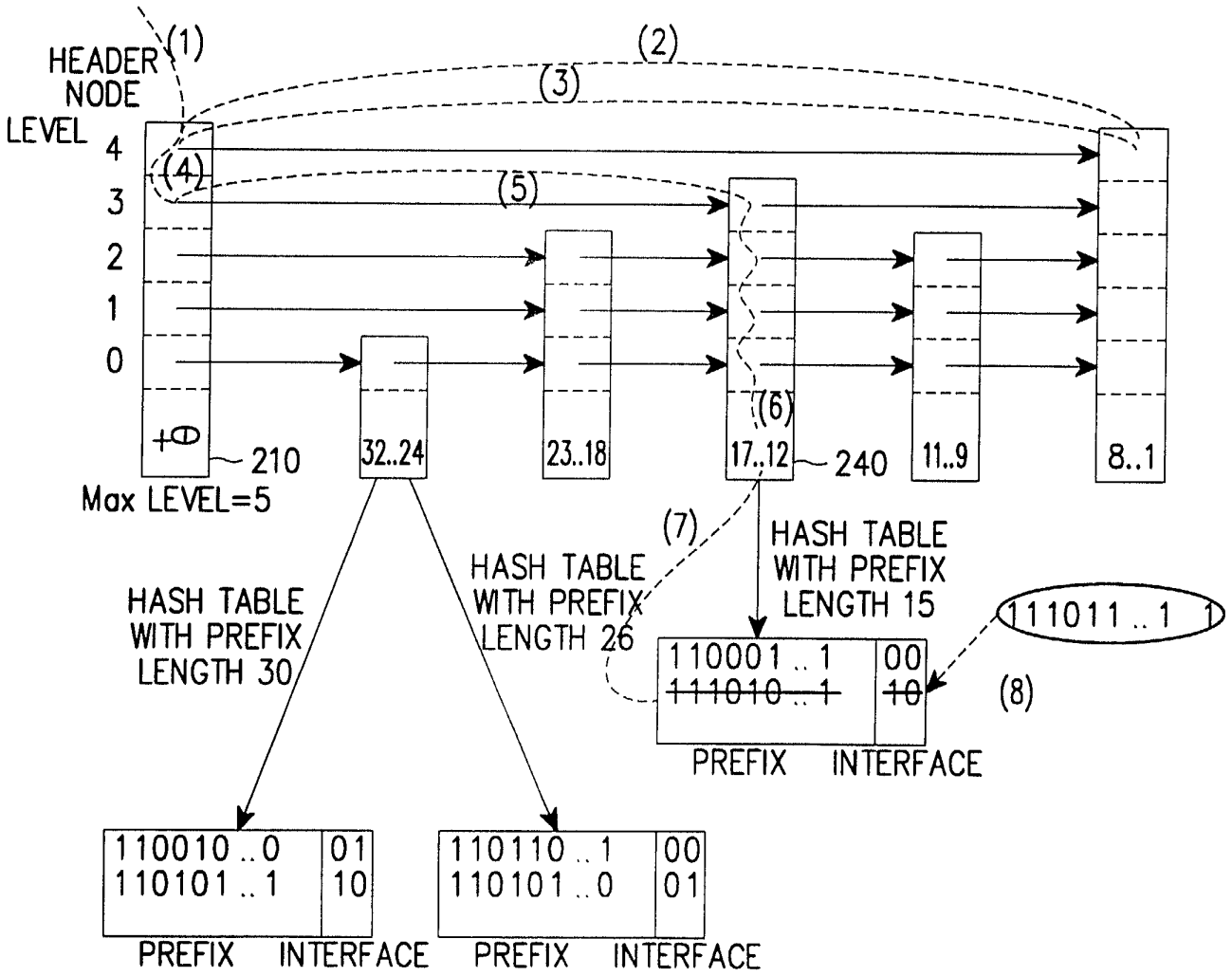

HEADER NODE LEVEL
4
3
2
1
0
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
210
Max LEVEL=5
32..24
23..18
17..12
240
11..9
8..1
260
HASH TABLE WITH PREFIX LENGTH 30
HASH TABLE WITH PREFIX LENGTH 26
HASH TABLE WITH PREFIX LENGTH 15
110010 .. 0
110101 .. 1
01
10
PREFIX
INTERFACE
110110 .. 1
110101 .. 0
00
01
PREFIX
INTERFACE
110001 .. 1
111010 .. 1
00
10
PREFIX
INTERFACE

FIG. 14


HEADER NODE
LEVEL
4
3
2
1
0
(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
+0
210
Max LEVEL=5
32..24
23..18
17..12
240
11..9
8..1
HASH TABLE WITH PREFIX LENGTH 30
HASH TABLE WITH PREFIX LENGTH 26
HASH TABLE WITH PREFIX LENGTH 15
110001 .. 1
111010 .. 1
00
10
PREFIX
INTERFACE
111011 .. 1 1
110010 .. 0
110101 .. 1
01
10
PREFIX
INTERFACE
110110 .. 1
110101 .. 0
00
01
PREFIX
INTERFACE

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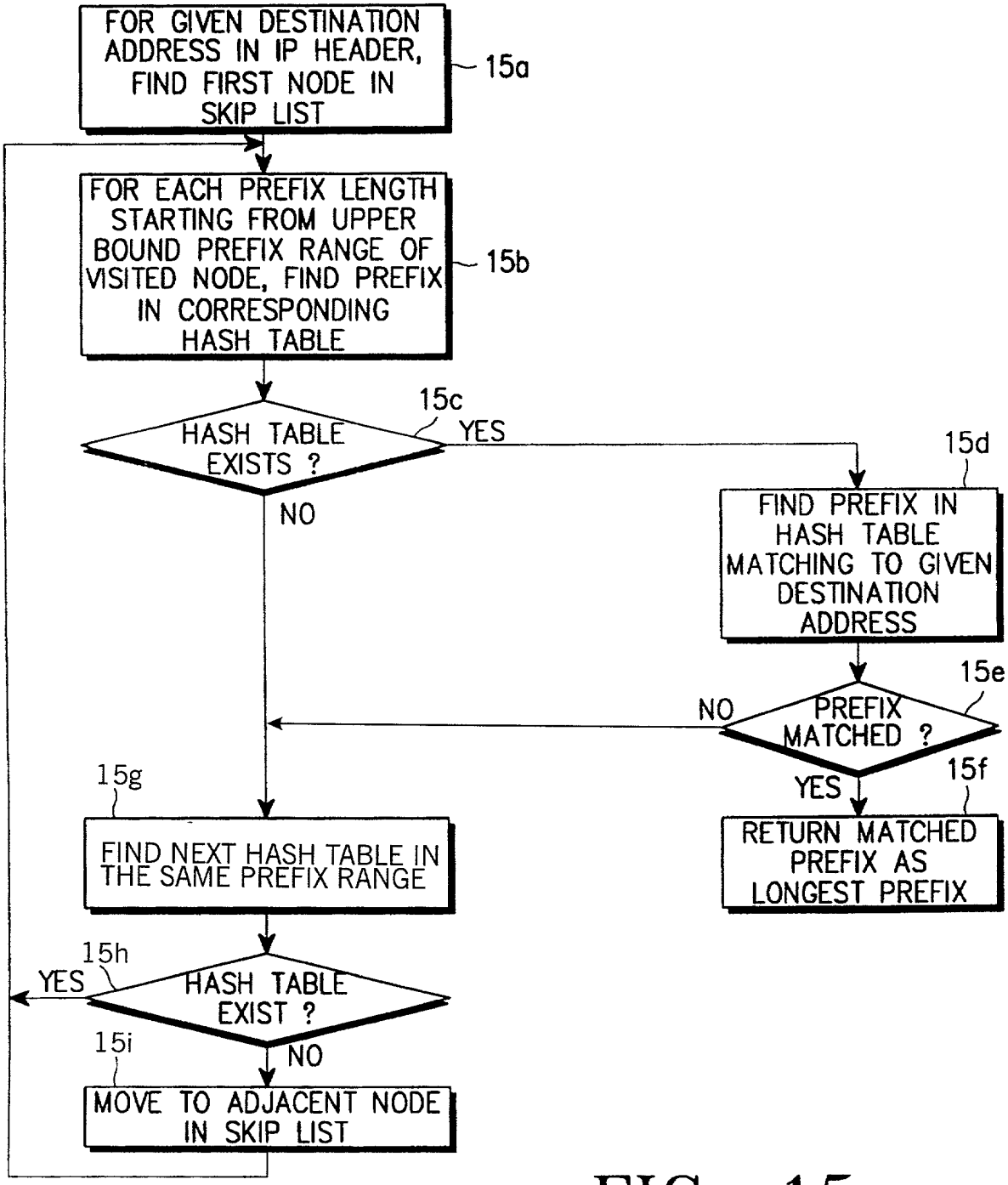
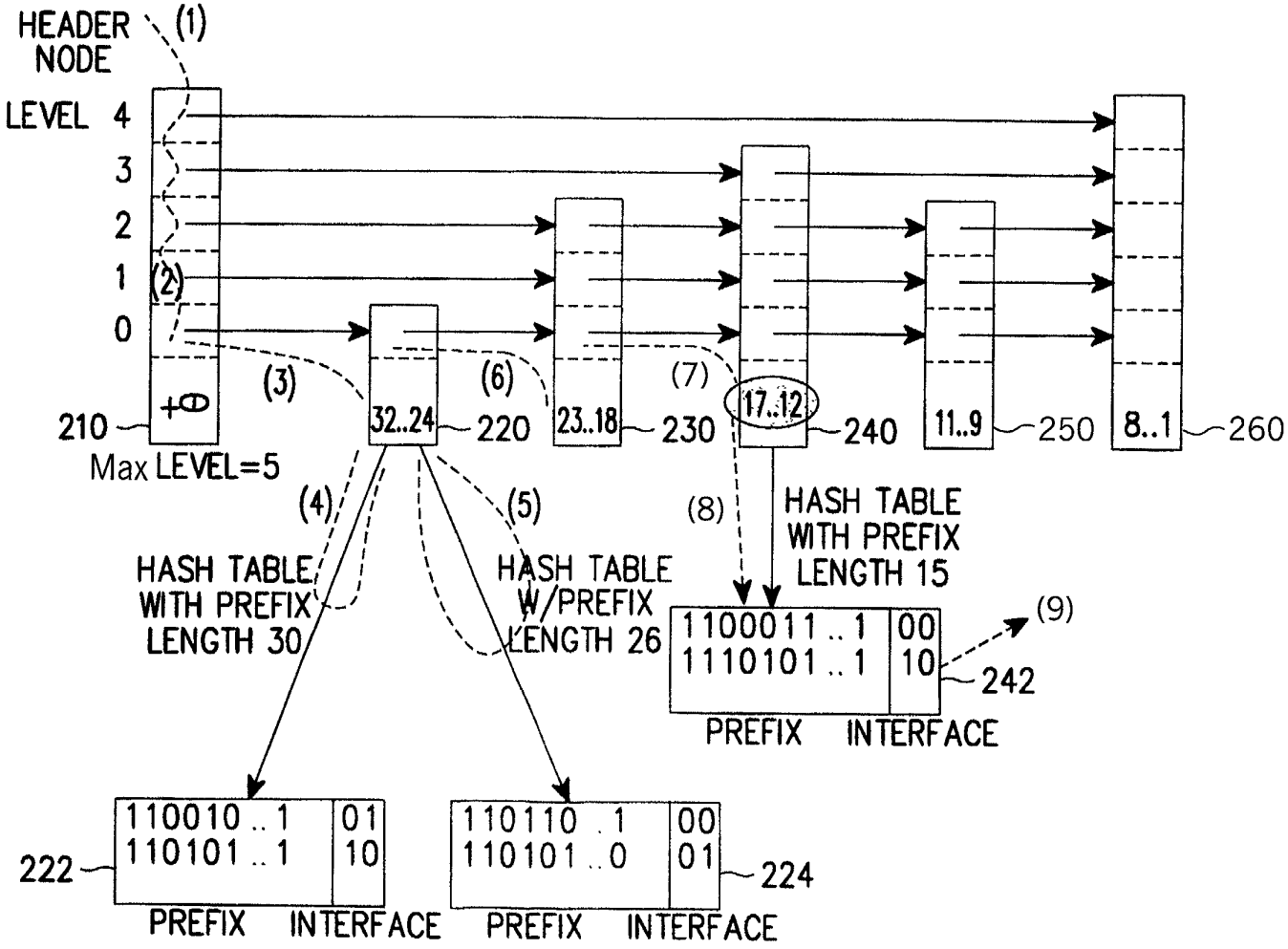


FIG. 15


HEADER NODE
(1)
LEVEL 4
3
2
1
(2)
0
+0
210
Max LEVEL=5
(3)
32..24
220
(6)
23..18
230
(7)
17..12
240
11..9
250
8..1
260
(4)
(5)
(8)
HASH TABLE WITH PREFIX LENGTH 30
HASH TABLE W/PREFIX LENGTH 26
HASH TABLE WITH PREFIX LENGTH 15
1100011 .. 1
1110101 .. 1
00
10
242
(9)
PREFIX
INTERFACE
110010 .. 1
110101 .. 1
01
10
222
PREFIX
INTERFACE
110110 .. 1
110101 .. 0
00
01
224
PREFIX
INTERFACE